FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 826. (No. 43, Vol. XVI.) OCTOBER 23, 1924 [Weekly, Price 6d. Post free, 7d.

Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C. 2
Telegrams: Truditur, Westcent, London. Telephone: Gerrard 1828
Annual Subscription Rates, Post Free:
United Kingdom .. 30*s.* 4*d.* Abroad .. .. 33*s.* 0*d.**
These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates
* *European subscriptions must be remitted in British currency*

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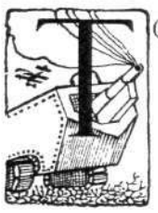
EDITORIAL COMMENT.



TO those who follow closely the development of aircraft design in all countries there is a very distinct tendency towards all-metal construction. In Germany a few designers have made a special study of the problems, although probably it is true to say that the majority of German aircraft types are still of all-wood or of composite construction. Notable examples of the all-metal types are, of course, the Dornier, Junkers and Rohrbach machines, each designer following his own particular methods. The former employs both steel and Duralumin, while the two latter use Duralumin almost exclusively. In Holland we have Fokker using welded steel tube fuselage construction, but showing a marked preference for wood construction in the wings.

All-Metal Construction

In France also a very considerable number of firms have experimented with all-metal construction of every conceivable kind, but in the main employing Duralumin in preference to steel, the reason being, we believe, that France produces the former but not the latter in the forms suitable for aircraft work. Consequently, the special high-tensile steels imported from England come rather expensive, and the majority of designers prefer to use Duralumin. In the United States also a great deal of work has been done on the development of all-metal machines, both steel and aluminium alloys having been employed.

If we turn to matters at home, it is found that Great Britain, for various reasons, has been relatively slow in adopting the all-metal construction. For one thing, the British Air Ministry for years took the view that Duralumin was not to be trusted for parts likely to be heavily stressed, and, consequently, the use of this material was discouraged. One result of this attitude was that such of our designers as were believers in all-metal aircraft were obliged to attack the problems of steel construction—in some ways considerably more difficult than the use of aluminium alloys, owing to the much thinner sheet that has to be employed.

It may now be said, without fear of challenge, that certain British designers have developed all-steel

construction to a point where not only is it the equivalent of wood as regards strength/weight ratio, but its use enables a saving in weight of something like 15–20 per cent. to be made. For sheer quality and refinement of construction, there is nothing to surpass British all-steel construction. Other forms there may be which are cheaper, simpler, more robust, and which will withstand rougher usage, but as regards scientific design we honestly and firmly believe we are justified in saying that the methods developed by British designers are in the very front rank.

The fact that the British Air Ministry has now relaxed in its opposition to the use of aluminium alloys is already beginning to have its effect, and at least one British firm has developed, and is at last being afforded an opportunity to demonstrate by actual practical building of machines, methods of all-Duralumin construction on distinctly original lines. Others are experimenting with different forms of treatment of the sheet metal, and altogether it may be said that although, owing to the work being in nearly all cases undertaken by the various firms for the Air Ministry, and therefore treated as secret and confidential, little is allowed to become known relating to the detail work being done and the success already achieved, Great Britain is by no means lagging behind in the matter of metal construction, be it in steel or aluminium alloys. Apart from the firms which were pioneers in the development, others are slowly taking the matter up, and if one were permitted to speak of the work being done it could be demonstrated that by now there is but a very small percentage of our constructors who have not commenced to replace, slowly and step by step, the older wooden structural members by metal ones. Thus the position, as far as Great Britain is concerned, is by no means unsatisfactory, except in so far as full credit cannot, in most cases, be given to the firms responsible for placing this country well to the forefront in this particular form of aircraft development.

What has given rise to these thoughts on metal construction is the paper read by Dr. Rohrbach before the Royal Aeronautical Society on Thursday of last week. Dr. Rohrbach was, as is, of course, well known, chief designer at the Zeppelin-Staaken works, where he was responsible for the large four-engined monoplane which was so wantonly and foolishly destroyed by the Inter-Allied Commission. Since that time, Dr. Rohrbach has established a factory in Copenhagen, where he has constructed the all-metal flying boat Ro. II, which formed the main theme of his lecture. Work is, however, still being carried on in Berlin, but this is more in the nature of research work than actual construction, the restrictions placed upon German aircraft constructors being such that very little practical work can be usefully carried out.

With reference to the paper itself, we are afraid Dr. Rohrbach did not make out as good a case as he might have done for the all-metal large seaplane. Whether the reason was that the lecturer had somewhat failed to appreciate the scientific nature of the the Society, and thus had kept his lecture rather "popular," or whether other reasons caused him to refrain from really making out a sound technical case, we naturally do not know. We think it must be admitted, however, that the paper as read gave rather less actual technical information than most had expected. Dr. Rohrbach was challenged on certain points, some of his conclusions being, or appearing to be, open to doubt in the absence of more definite proof in the way of facts and figures.

We do not for a moment suggest that Dr. Rohrbach was deliberately making claims which could not be substantiated. On the contrary, we incline to the opinion that he claimed rather less than he might have done for the large all-metal seaplane. Rather do we think that the lecturer overlooked the fact that most of his audience had not had the same facilities for studying the matter at close quarters and from the same angle, and that consequently certain statements made, statements which may have appeared to the lecturer as obvious and requiring no proof, failed to convince certain members of the audience.

As to the future possibilities of the large all-metal seaplane, we share the optimism of Dr. Rohrbach, and to the British Empire particularly the type should be of the greatest possible utility. Whether the machine of the future will be of steel or of aluminium alloy we are not prepared to venture to prophesy, nor are we necessarily convinced that it will be a monoplane. That the Ro. II, which is now being built by Wm. Beardmore and Co., is a very efficient machine cannot be doubted. To attain a speed of over 120 m.p.h. with a machine weighing 14,000 lb., propelled by some 700 h.p., is not possible except with a machine which is aerodynamically efficient. We do think, however, that the marked superiority of the monoplane over the biplane in such large machines has not yet been conclusively established, and we believe the future will show that there is room for both types. In the meantime it is satisfactory to know that a machine incorporating so many highly interesting features as does the Rohrbach, will now be constructed in this country, and that thus the British Air Ministry will have an opportunity of actually comparing performance and behaviour with that of other types.

In looking at the lantern slides and cinematograph film of the Rohrbach Ro. II, it was impossible not to be impressed by the originality of the designer. The constructional features were of extraordinary interest, and, personally, we could not help noticing how the particular form of wing construction, with the portion between the spars forming a box to the front and back of which were hinged the leading and trailing edges, appeared to demand as a logical development the incorporation of wing slots. At present these slots are merely gaps between the edges, and with the spar faces open, but all the elements of a slotted wing appear to be present. It would merely be a question of suitably forming the inner faces of leading and trailing edges and outer faces of the spars, and incorporate some form of cam mechanism for operating the leading and trailing edges, and a two-slot wing would result. The one thing which Mr. Handley Page claims for the slotted wing is that it permits heavy loading without unduly increasing the landing speed, and the one strong point made by Dr. Rohrbach was that for large machines heavy wing loading was essential if the structure weight was to be kept down. The peculiar form of wing construction of the Ro. II obviously lends itself to the use of slots. Consequently, the logical development would appear to be the Rohrbach wing fitted with Handley Page slots. If the large machine of the future is to materialise, all possibilities should be explored, and here appears to be an avenue promising interesting results.

FLIGHT
AIRCRAFT ENGINEER AND AIRSHIPS

AIR MAIL SERVICES IN THE REPUBLIC OF COLOMBIA

WITH the establishment of two new air lines this summer, the Republic of Colombia becomes one of the first nations in the world to connect all of its principal commercial centres by air mail. Air lines in this republic now measure 1,104 miles—but figures of distance mean comparatively little until savings in time are considered. Six seaplanes following the tortuous course of the Magdalena River, and three landplanes vaulting the mountain ranges, reduce communication to hours as contrasted with days, and even weeks, by shallow-draft steamer, railway or pack-team. We have already referred in FLIGHT to the saving of time in mail transport by the establishment of the day and night trans-continental air service in the United States. This service, it is claimed, has enabled exporters to save as much as three days on steamer sailings to South America, while U.S. mail on arriving at Barranquilla—the Atlantic seaport of Colombia—is carried by seaplanes 625 miles into the interior in 8½ hours, whereas by river boat this part of the trip requires regularly eight days and in exceptionally dry seasons as much as 15 days.

The company operating the air mail services in Colombia is the Sociedad Colomba-Alemana de Transportes Aereos, or, as it is more generally known, "Scadta." Since its establishment in 1921 Scadta has covered 368,530 miles in 4,521 miles of flight. It has carried 2,830 passengers and 14,522 kilograms of mail, which makes, including shipments of money and other merchandise, a total of 219,567 kilograms of pay-load. Savings in time in interior transportation are almost unbelievable. In one instance trails that are traversed only in four days by mule pack are covered in 70 minutes by 'plane.

Special services have also been performed by Scadta. The region of the Catatumbo River, which had long been in dispute between Colombia and Venezuela, was surveyed from the air. This region is covered with vast swamps and tropical forests. Three thousand nine hundred square miles had to be mapped. It was estimated that this would require two years' time and the expenditure of $200,000 if done by surface methods. In 16 days Scadta covered the entire area, taking 1,800 photographs from the seaplane "Caldas." The total cost was one-tenth of the estimated cost by land.

Colombia is one of the richest countries in the world, but due to the character of the terrain, the Magdalena River has been the principal artery of communication. The capital, Bogota, and many of the other important business centres are located high in the mountains 750 to 1,000 miles in the interior. To get the natural riches out of the country, as well as to bring in the goods of other countries which these riches purchased, required that advantage be taken of the fastest and most modern means of communication.

After the war Colombian and German capital combined to make an aerial survey, and in 1920 the first seaplane safely reached Girardot, on the upper reaches of the Magdalena, 625 miles from Barranquilla. The company was soon confronted with engineering and meteorological problems, which resulted in the establishment at Barranquilla of laboratories and works at which materials, engines and completed craft could be tested. The machines used are of the Junkers all-metal type.

While constructed at first for passenger carrying, the seaplanes were adapted to cargo work. Arrangements were made with the Colombian Government whereby mail could be carried and the regular Colombian postage included in the special air mail stamps which Scadta issued. Regular weekly round trips between Barranquilla and Girardot were established in August, 1921, and since then the service has continued without interruption, and without loss of mail.

The following lines are now in operation: Barranquilla-Girardot, 625 miles, 8½ hours by seaplane, 8 to 15 days by steamer; Girardot-Neiva, 94 miles, 70 minutes by airplane, 4 days by mule pack; Barranquilla-Cartagena, 75 miles, 60 minutes by seaplane; Medellin-Cali, 200 miles, 3 hours by airplane; Puerto Wilches-Bucaramanga, 75 miles, 60 minutes by airplane, 4 days by mule back.

Two air mails fly weekly each way between Barranquilla and Girardot, making connections with North America and European steamers. At Girardot, the mail lies over for the night, and next day proceeds 100 miles by train to Bogota. It takes the train 8½ hours to travel this 100 miles, just the same time required by the seaplane to fly 625 miles from Barranquilla. *En route* to Girardot, mail is delivered at Magangue, El Banco, Barranca-Bermeja, Puerto Berrio and Honda. The mail is taken by special messenger from Puerto Berrio to Medellin (there to connect up with the land plane line); from Honda to Manizales and from Girardot to Bogota, Ibague and Tunja. Every Tuesday and Friday the air mails leave Girardot for Barranquilla, following the arrival of the train from Bogota. Every Thursday an air mail round trip is made from Girardot to Neiva. The flight, Barranquilla-Cartagena is made twice a week, connecting with the Barranquilla-Girardot line.

AIR MAIL SERVICES IN COLOMBIA: Sketch-map showing the air mail routes operated by S.C.A.D.T.A. Inset is a reproduction of one of the special air mail stamps used.

The air-mail postage, with the flight to Girardot as a standard, is 30 cents (United States currency) for each ½ oz. This includes Colombian national postage. Persons outside Colombia can send any mailable articles addressed to the interior of Colombia by placing on their letters the air mail stamp alone. These letters should be placed inside another envelope, which should then be addressed "A La Officina del Correo Aereo, Barranquilla, Apartado No. 203 (Colombia, S.A.)." To this second envelope should be affixed sufficient postage to carry it to Barranquilla. In addition to its connections in New York, San Francisco, Chicago, New Orleans and Boston through the American Trading Company, Scadta has established agencies in the following foreign cities; Hamburg, Amsterdam, Paris, London, Liverpool, Berlin, Berne, Copenhagen, Barcelona, Milan, Yokohama, Buenos Aires, Caracas and Callao. In fifteen business centres in Colombia, Scadta maintains its own agents and offices.

It may be of interest to add that the special air mail stamps for use from the various foreign countries referred to above, are obtainable from the Scadta agents in each respective country, these stamps being overprinted with initial letters representing that country.

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Air Traffic in Bavaria

IT is reported that a company is being formed in Bavaria with the object of laying out aerodromes for inter-State and local air traffic, and probably the scheme will receive State aid. Incidentally, it has been decided to continue during this winter the various air services of the Trans-Europe-Union.

An Ader Celebration

M. CLEMENT ADER, the inventor of the first French aeroplane, which made a flight of 300 yards in 1897, recently celebrated his 83rd birthday at Muret (Haute Garonne), his birthplace, where a public demonstration took place in his honour.

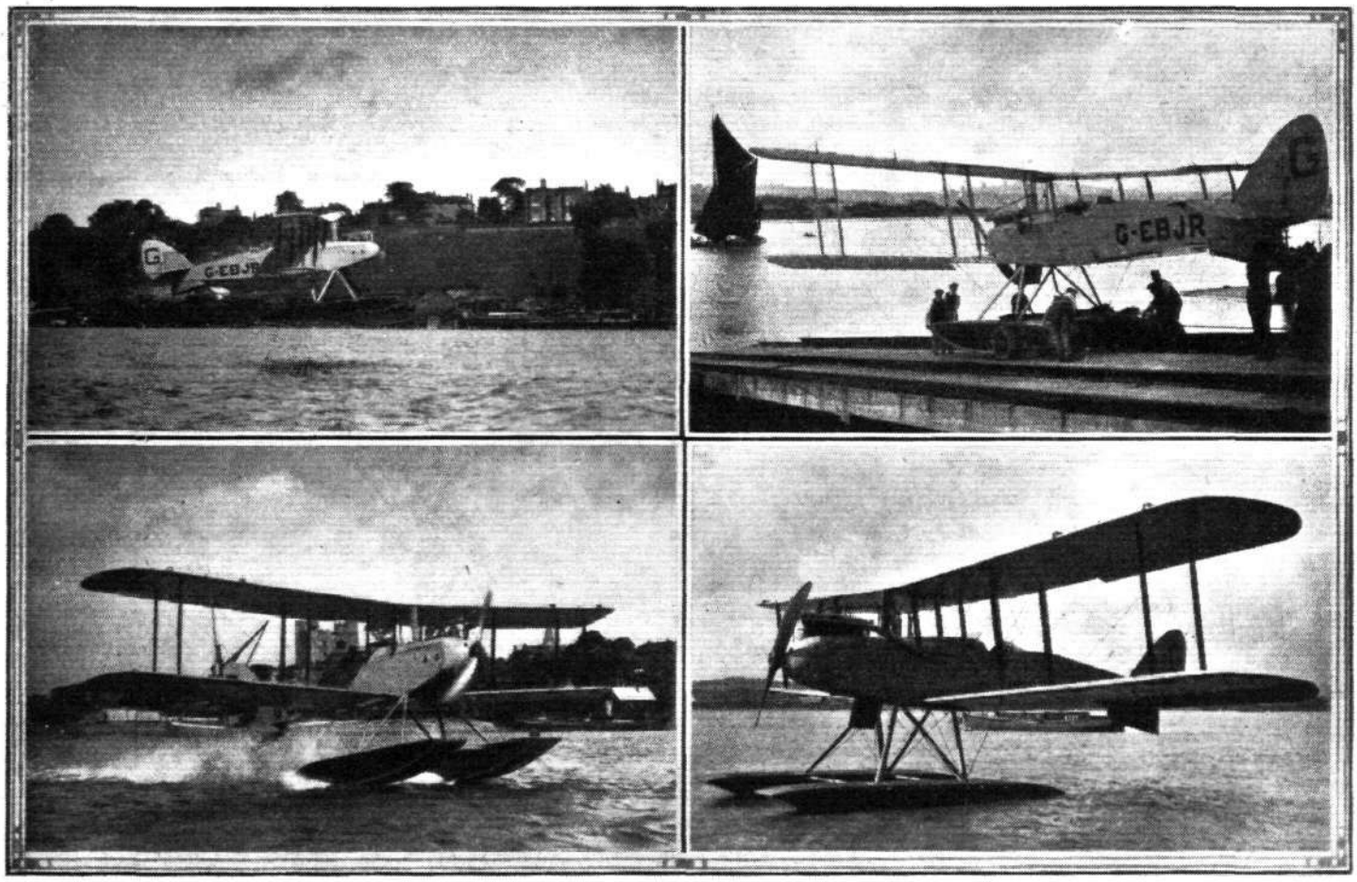
DE HAVILLAND SEAPLANES

IN view of the number of inquiries received—especially from the Colonies—by the De Havilland Aircraft Co., Ltd., of Stag Lane Aerodrome, Edgware, for seaplanes similar as regards type and performance to the popular D.H. 50 landplane, this firm decided to carry out some experiments with a D.H. 9 biplane fitted with floats in order to collect the necessary data which would enable them to produce a successful float undercarriage suitable for use with the D.H. 50 four-passenger machine.

We show in the accompanying illustrations four views of a D.H. 9 seaplane, with which some tests were carried out recently in connection with the above problem. These tests were entirely successful, and some very satisfactory figures were obtained. The weight of the D.H. 9 seaplane, empty but including water, is 2,900 lbs., and the weight fully loaded 3,900 lbs., the load being distributed thus :—Petrol (55 gals.), 395 lbs. ; oil (8 gals.), 80 lbs. ; pilot, 180 lbs. ; paying load, 345 lbs.

The speed at ground level is 104 m.p.h., and at 10,000 ft. 100 m.p.h. ; the cruising speed is in the neighbourhood of 90 m.p.h. It has a very good climb—600 ft. per min. at ground level—it taking 32 mins. for a climb to 10,000 ft. and 9 mins. to 5,000 ft.

From these figures it has been deduced that the D.H. 50, fitted with the same undercarriage, would be entirely satisfactory as a commercial seaplane, and the performance and characteristics would be approximately as follows :—



THE D.H.9 SEAPLANE : Four views of the D.H.9 (230 h.p. Siddeley "Puma" engine) with which trials were recently carried out with the object of producing a suitable float undercarriage for use on the D.H.50 biplane. There is considerable demand for a seaplane of this type for use in the Colonies.

Weight, empty, including water	2,940 lbs.
Petrol, 55 gallons	395 lbs.
Oil, 8 gallons	80 lbs.
Pilot	180 lbs.
Paying load	565 lbs.
Weight fully loaded	4,160 lbs.
Speed at ground level	140 m.p.h.
Cruising speed	90 m.p.h.
Speed at 10,000 ft.	100 m.p.h.
Rate of climb at ground level	550 ft. per min.
Time to 10,000 ft.	35 to 40 mins.
Time to 5,000 ft.	13 mins.
Time to unstick	26 secs.

A Norwegian Flight to the North Pole

ANOTHER attempt to reach the North Pole by air is reported from Norway. Lieuts. Larsen and Dietrichson are preparing plans for a flight, with two machines, from Spitzbergen next Spring. Should the scheme be financially assured they will offer the leadership of the expedition to Capt. Amundsen.

South Africa's Air Force

COL. CRESWELL, South African Union Minister of Defence, appears to be causing some misgivings as to the effect of his far-reaching plans for the reorganisation of the Union Defence Force. Even the Union Air Force, which has never been developed to any great extent, is, it is said, to be reduced under the new scheme.

Italian Aeroplanes Bomb Senussi

ON October 12 two Italian aeroplanes flew from Benghazi, Cyrenaica, to Jalo (230 miles away) and dropped bombs on the headquarters of the Senussi insurgents, who have, up to the present, considered their stronghold impregnable. The machines returned safely to Benghazi.

R.A.F. Officers from Cambridge University

THE Air Ministry announces that on the nomination of the Board of Military Studies of the University of Cambridge the undermentioned graduates of Cambridge University have been appointed to permanent commissions as pilot officers in the General Duties branch of the Royal Air Force, with an antedate in each case of 12 months' seniority under the University candidates scheme of entry :—Ronald Melbourne, Edward Collis de Vivac Lart.

FLIGHT

LIGHT 'PLANE AND GLIDER NOTES

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

UNDER the Official Notices of the Royal Aero Club last week was published a table giving the net lap times, etc., of the various competitors in the Grosvenor Cup Race held at Lympne on October 4. Several interesting facts, apart from the actual speeds made, emerge from this. The regularity with which all those competitors who completed the 100 miles' course did their laps is rather remarkable, the majority being within a very few seconds of the same time for each lap. The winner, Hinkler, on the Avro "Avis," differed only by 18 secs. between his fastest and his slowest lap. Somewhat similar results were attained by other competitors. The fastest machine to complete the course was the Parnall "Pixie II" single-seater of last year, but fitted with a special 1,000 c.c. engine. The R.A.E. Aero Club's "Hurricane" was not, however, very much slower, and actually covered the sixth lap at a slightly higher speed than that of the "Pixie II." It forced-landed in the seventh lap, however. The long time taken by the Vickers "Vagabond" No. 16, for the first lap is accounted for by a delay which occurred in starting the engine, the time thus spent counting as flying time.

* * *

IN the case of those competitors who did not complete the course no speeds are given in the table, but the following are the approximate average speeds for the number of laps completed:—No. 16, 69 m.p.h.; G-EBHN, 66 m.p.h.; No. 7, 70 m.p.h.; No. 20, 78 m.p.h.

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REFERENCE has already been made in these notes to the interest taken by the Air Ministry and the R.A.F. in the Lympne light 'plane competitions. Distinguished representatives of both were present throughout the trials, and as further evidence of their interest the Air Ministry intimated, immediately after the Lympne week, that it had been decided to test thoroughly at Martlesham any light 'planes which constructors might care to send there for test. Thus the machines that were prevented by sundry minor troubles from taking part in the competitions will be given a perfectly fair trial, and will be tested for performance with the aid of all modern appliances so as to ensure exact comparative results.

* * *

WITH commendable promptitude the Royal Aeronautical Society has arranged for a paper to be read on the subject of the Lympne light 'plane trials on October 30, and it is significant that the lecturer on this occasion will be Major J. S. Buchanan, A.F.R.Ae.S., of the Technical Department of the Air Ministry. Thus again we have proof of the keenness with which the Air Ministry is watching the light 'plane development, and although it appears probable that Major Buchanan will be expressing personal opinions only, it is equally likely that his view will not differ widely from those of the Air Ministry. The paper should, therefore, be of more than usual interest, especially as Major Buchanan was present at Lympne throughout the week and had unrivalled opportunities for studying the machines at close hand. The paper, as we have said, should prove uncommonly interesting, and all of our readers who can possibly do so should make a point of attending. The lecture will be held at the Royal Aeronautical Society's offices, 7, Albemarle Street, and will commence at 5.30 p.m.

* * *

IN connection with our remarks in these columns last week, concerning the use of pre-War 30 h.p. "Y"-type Anzani engines for giving the slow-speed light 'plane engine a practical trial before definitely deciding upon the type to develop, we have received from the Northern Engineers Supply Co., of Canning Road, Abbey Mills, West Ham, London, E. 15, a letter stating that this firm has four of these engines in perfect order, but without magnetos and carburettors. We understand that these engines are to be had very cheaply should any firm be interested in giving them a trial in a modern light 'plane.

* * *

AUSTRALIA is taking a keen interest in the light 'plane movement, and it is felt that in the outlying districts of the British Empire even more than at home, there will be a great future for aeroplanes of this type. Whether or not the "right" type has been evolved is, perhaps, open to argument, but manufacturers would do well not to overlook the possibilities of business in the Dominions. It appears likely, however, that what will really be required there is something more simple and robust than some of the machines produced for the actual Lympne competitions. It should be recollected that the formula upon which was based the award of marks placed a premium on wide speed range, and in order to get this very special features were called for. Probably the private owner-pilot, especially abroad, will prefer to sacrifice a certain amount of performance in order to have a 'plane which is simple and strong, provided the weight does not become such as to overload the engine fitted.

* * *

INCIDENTALLY, this question of designing for the special conditions obtaining in the Colonies, raises the problem of wood *versus* metal construction. Owing to the extreme temperatures to be met with, there seems to be reason to suppose that metal construction would have a considerable advantage, although against its use is frequently advanced the objection that repairs and replacements are more difficult to effect, at any rate by local and more or less unskilled labour. On the other hand, it might be argued that, except for bad crashes, the need for repairs should be less frequent than in the case of the wood machine. Lympne certainly produced excellent machines of both forms of construction, and doubtless the future will show that there is a market for both, one type being suitable in one part of the Empire and another more favoured in other districts.

* * *

WITH regard to the wood machine there is a further development along the lines of construction employing local timber. It would seem likely that, until such time as quantity production of all-metal light 'planes becomes a commercial proposition, a good plan might be for our designers to supply complete designs of their machines to be built under licence from timber actually grown in the locality where the machines are to be used. There are, of course, certain difficulties in the way, such as a thorough knowledge, on the part of the designer of the machine, of the characteristics and suitability of the timbers obtainable, but doubtless the various forestry departments would be willing to help with any information likely to be of use.

* * *

IN the meantime Australia has taken the lead as regards home construction of light 'planes, and we understand that arrangements have been made for a light 'plane competition to be held there shortly. At the moment no particulars are available, but we hope to be able to publish an account, and possibly photographs of some of the Australian machines in a forthcoming issue of FLIGHT. It will be interesting to see how Australian designers tackle the problem of the light 'plane. While they may be assumed to have had less experience of aircraft design than our old-established firms, they will undoubtedly have their own ideas as to what is required, and this fact in itself should prove highly instructive to our own designers.

* * *

A READER has written to remind us that the Selfridge glider prize of 1,000 guineas is still open for competition. This prize, it will be recollected, is offered for the first cross-country flight of 50 miles in a glider, measured from starting to landing point. If the prize is not won, half the amount will be awarded to the pilot who first covers 25 miles in gliding flight.

An Egyptian Air Force

THE Egyptian Government is examining the proposal submitted a year ago for the creation of an Air Service under the Ministry for War. It is proposed to purchase eight aeroplanes and to send selected Egyptians to England and British air centres in Egypt for training as pilots and mechanics. The main idea is that the Air Service should supplement the Camel Corps in patrolling the land frontiers, which are very long and run entirely through desert, both west and east. The main frontier stations will be at Sollum and El Arish.

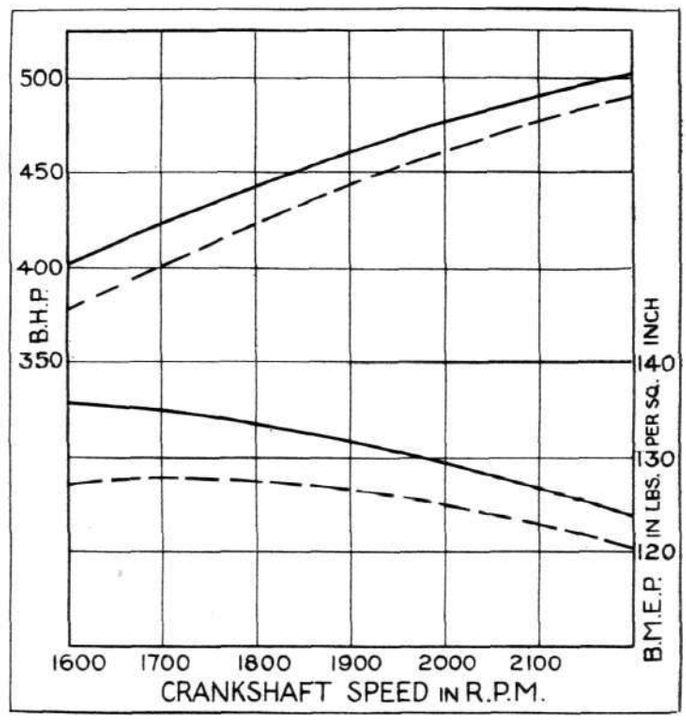
NAPIER "LION" PASSES 104 HOURS' TEST

10 Non-Stop Runs of 10 Hours Each

WHEN the 50 hours' bench tests for aero engines were first introduced there were those who thought the demands on the engines unduly severe. Five runs of 10 hours each appeared at the time rather unreasonable. Yet such has been the progress in aero engine design and construction that quite a number of different types of British aero engines have successfully completed their 50-hours' tests. The result has naturally been that the prestige of British aero engines abroad has increased very materially, and thus an official regulation that at first had the appearance of being somewhat prohibitive, has ultimately turned out to be a blessing in disguise. These tests, as is, of course, well known, are insisted upon before an aero engine is passed as airworthy and suitable for use in the Royal Air Force. They are carried out under the rigid supervision of the Aircraft Inspection Department, and consequently the fact that an engine has passed its tests and has been declared airworthy is in itself a very good guarantee that the type is of high quality. Lest it should be thought that aero engine manufacturers are satisfied with one such 50-hours' test, it may be pointed out that in the case of the famous Napier "Lion" engine no less than ten such tests of 50 hours each have been carried out, giving a total duration of 534 hours, and that each test has been passed with flying colours.

A short time ago the Air Ministry instituted a still more difficult test for aero engines, consisting in ten non-stop runs of ten hours each, which, including sundry runs after the main series so as to ascertain full-power and full throttle curves, bring the total up to 104 hours. Quite recently a Napier "Lion" was put to this test, which it passed as successfully as it had passed the previous 50 hours' tests. The "Lion" was a series VI. E. 75 direct drive with a compression ratio of 5·8 to 1. In the accompanying graph the power and B.M.E.P. curves shown in full lines refer to a power run taken before the 103 hours' test, while the broken line curves refer to a power run taken subsequent to running 103 hours type test. It will be seen that neither the power nor the mean effective pressure has suffered seriously as a result of the prolonged running, especially at the higher speeds.

Starting with a power curve run, the test included ten periods of ten hours' duration each at 2,000 r.p.m.; 99 of these 100 hours were run at 420-425 b.h.p., the hundredth hour being run at approximately 470 b.h.p. Then followed ten minutes' slow running at 500 r.p.m., at the end of which period the engine was opened up to 2,310 r.p.m., and was run for one hour at this speed, developing approximately 350 b.h.p. A further hour at 2,200 r.p.m. was run at full throttle, the engine developing approximately 500 b.h.p. The final power curve run completed the test. No part of the engine was changed or adjusted during the test, and even 100 hours does not appear to mark the maximum duration of time for which the Napier "Lion" can run under these strenuous conditions, as at the end of this official test the engine was still running in a thoroughly satisfactory manner. It certainly must be admitted that by this test the ungeared Napier "Lion" has worthily upheld the Napier reputation.



B.H.P. AND B.M.E.P. CURVES OF NAPIER "LION": The curves shown in full refer to a run taken previous to the 103 hours' test, while the broken line curves give the results of a run taken after the 103 hours' test. The engine was an ungeared type, with a compression ratio of 5·8 to 1.

R.A.F. MEMORIAL FUND

THE first meeting of the Executive Committee subsequent to the summer vacation was held at No. 7, Iddesleigh House, Caxton Street, on the 15th instant, and the following members of the Committee were present: Lord Hugh Cecil (Chairman), Lady Leighton, Mrs. Barrington-Kennett, Mrs. L. M. K. Pratt-Barlow, Sir Charles McLeod, Air Vice-Marshal Sir Geoffrey Salmond, Air Vice-Marshal Sir Philip Game, Air Commodore C. A. H. Longcroft, Lieut.-Comdr. H. E. Perrin, Mr. W. S. Field.

A very satisfactory list of donations and subscriptions for the period which had elapsed since the last meeting, held on July 23, was submitted to the meeting by Sir Charles McLeod, Hon. Treasurer.

The amount of grants, viz. £1,315 19*s*. 9*d*., was approved by the meeting for a similar period, viz. since July 23, and which includes grants made towards officers and their dependents.

A scheme was approved, under which grants of money were sanctioned for the use of air officers commanding R.A.F. commands abroad.

The question of an extension of the scheme concerning Vanbrugh Castle School was adjourned to the next meeting.

The Committee were informed of, and noted with very much regret, the death on September 4 of Mrs. M. E. Salting, who has been such a great benefactress to the Fund, and by whose kindness the "Salting Benefaction" was instituted for the grant of educational allowances for the sons and daughters of officers of the R.A.F., past and present.

The resignation of Air Vice-Marshal Sir Vyell Vyvyan, K.C.B., on that officer relinquishing the command of the Coastal Area with effect from September 1, 1924, was accepted, with very much regret. In his place, the Committee have been able to secure the services, as a member of the Executive Committee, of his successor, Air Vice-Marshal F. R. Scarlett, C.B.

The Committee authorised the purchase of a wreath, to be laid at the foot of the R.A.F. War Memorial on the Victoria Embankment, on a day in November, which will be selected by the Government in celebration of the signing of the Armistice, November 11, 1918.

The Late Sir Percy Scott

IT is with regret that we have to announce the death of Admiral Sir Percy Scott, Bart., K.C.B., K.C.V.O., who passed away, at the age of 71, at his London residence on October 18. Sir Percy entered the Navy in 1866, retiring in 1913, and achieved fame for his remarkable work in promoting efficiency in naval gunnery—on which subject he was admitted to be the greatest authority in the world. To readers of FLIGHT he will, perhaps, best be remembered for the strong views he held in favour of aircraft in connection with the battleship controversy, which has been raised on many occasions during the past few years. He was also responsible for the organisation of the gunnery defence of London against aircraft attack in 1915.

FLIGHT

THE MARTIN MODEL 70 COMMERCIAL BIPLANE

A NEW commercial aeroplane has just been completed by the Glenn L. Martin Co., of Cleveland, Ohio, the builders of the famous Martin twin-engined bombers extensively used by the U.S. Air Services. This machine, known as the Model 70, has been designed for either cargo or passenger carrying, and represents an efficient combination of speed and load capacity. Fitted with a 200 h.p. Wright model E4 engine, it has a speed range of 45–112 m.p.h., with a pay load of 750 lb., and has a cruising range of 550 miles. It was designed by L. C. Milburn, chief engineer of the Glenn L. Martin Co.

The Model 70 is a further development of the experimental night mail 'plane, which the Martin Co. produced last year for the U.S. Air Mail Service (described in FLIGHT for Nov. 1, 1923). Numerous minor changes have been made in the "70," with the object of improving its serviceability. The wings are entirely new, having about 65 sq. ft. less area, while the tail surfaces have been modified to correspond. Its landing speed is slightly higher than that of the "night 'plane," mainly for the reason that it has been found that many pilots prefer a higher landing speed for general work.

The Glenn Martin Model 70 Commercial biplane, a cargo or passenger machine fitted with a 200 h.p. Wright Model E.4 engine.

As will be seen from the accompanying illustration, it is an equal-span tractor biplane, with a single pair of "N" interplane struts each side. The wings are built up on birch plywood box-type spars, with Martin trussed spruce ribs. They are fabric-covered and the leading edge is reinforced with plywood back to the front spar. A 2-ft. "walk-board" is also fitted on the left-hand side of the fuselage in order that free access to the cargo or passenger compartment may be obtained without damage to the wings. Glenn Martin No. 15 wing section is employed. The interplane struts are of streamline steel tubing, and the strut connections are submerged in the struts. All members of the wings are designed to sustain eight times normal load.

The fuselage, which is well streamlined, is constructed of birch plywood supported by a spruce frame. The pilot's cockpit is located well aft of the main planes, and is exceptionally roomy and comfortable; excellent vision is obtained from this position for all conditions of flying and landing. In front of the pilot's cockpit is an enclosed cargo compartment of 28 cub. ft. Provision is made in this compartment for the rapid installation of two comfortable passenger seats. When passengers are carried, the flush turtle deck over this portion of the fuselage is replaced by a suitable cockpit-type of cowling.

A large manhole is provided in the middle of the bottom of the fuselage, the door of which is hinged and latched, and can be opened at once to permit access to the entire inside of the fuselage aft of the pilot's seat. A locker is provided behind the pilot's seat for carrying small luggage, spare tyre, tools, etc., and a space is left open behind the instrument-board to permit the connection and disconnection of any instrument without difficulty.

The engine mounting is of steel tube, with wood bearers. The radiator is mounted in the bottom of the fuselage below the engine, where it receives the full blast of the slip-stream through a specially-designed opening. After passing through the radiator, the air is drawn out through louvres in the side and bottom of the engine cowling. This latter is provided with extra large doors on each side, fastened with quick-release spring latches. When these doors are opened, the entire engine compartment is exposed, and all connections of the oil and water systems are conveniently reached. The petrol and oil filler-spouts are located outside the fuselage, and are fitted with quick-opening caps.

The control system is extremely simple, and is fitted with extra large pulleys and ball bearings, resulting in easy and rapid operations. The rudder bar is provided with an adjustable tension to compensate for engine torque and slip-stream effects. The tail skid is steerable, and is operated from the rudder foot bar. Amongst the "refinements" on this machine may be mentioned the following: Anchor rings are provided at the wing tips in order to facilitate the machine being staked down in the open should this be necessary, while rings are also provided in the top surface of each wing panel so that these may easily be swung into place during assembly; accurate spirit levels are built into the wings and fuselage to permit rapid rigging and adjustment.

The landing gear, of the divided-axle type, is substantially built and braced. It is made of steel tube, and has a comparatively wide track. The brace struts join the axle through a fork fitting which permits the shock-absorber unit to be wound on the bench. The wheels are 30 ins. by 5 ins.

Several of these machines have been built, and have been given commercial service tests by Test-pilot C. C. Caldwell between Cleveland–Chicago and Cleveland–New York, on which very favourable reports were given by the pilot.

The principal characteristics of the Glenn-Martin M.70 are:—

Span	38 ft.
Chord	5 ft. 4½ ins.
Gap	4 ft. 10 ins.
Overall length	27 ft.
Height	12 ft.
Total wing area	365 sq. ft.
Area of ailerons (four)	36 sq. ft.
Area of tail plane	28·2 sq. ft.
Area of elevators	10·4 sq. ft.
Area of rudder	11·4 sq. ft.
Area of fin	9 sq. ft.
Weight fully laden	3,500 lbs.
Weight empty (with water)	2,100 lbs.
Useful load	1,400 lbs. (40 per cent.)
Weight per horse-power	17·5 lbs.
Weight per square foot	9·5 lbs.
Speed range	45–112 m.p.h.
Climb (zero)	800 ft./min.
Climb in 10 mins.	6,500 ft.
Ceiling	17,000 ft.
Normal petrol capacity (64 gals.)	385 lbs.
Cruising radius	550 miles.

LARGE ALL-METAL SEAPLANES

A PAPER under above title was read by Dr. Rohrbach before the Royal Aeronautical Society on Thursday of last week, October 16. It was unfortunately not possible for the Society to send out advance proofs of the paper, so that the discussion was perhaps rather less interesting than it might have been. The paper itself suffered somewhat from being partly technical and partly popular, the author stating just enough to arouse the interest, or even to invite challenge on certain points, without advancing the proofs or giving the steps in his reasoning which had led him to the conclusions at which he arrived. To add to the difficulties, Dr. Rohrbach, although speaking English extraordinarily well, was obviously not always able to express himself with the clearness and conciseness with which he would have addressed an audience in his native language, and thus any shortcomings that might be apparent may very well have been, and probably were, due to this handicap rather than to any unwillingness on the part of the lecturer to disclose any real information.

Col. Alec Ogilvie was in the chair in the absence of Col. Tizard, who was suffering from a very bad cold and was unable to preside. In introducing the lecturer Col. Ogilvie recalled briefly the long experience which Dr. Rohrbach had had in all-metal construction, both on airship work and on heavier-than-air craft.

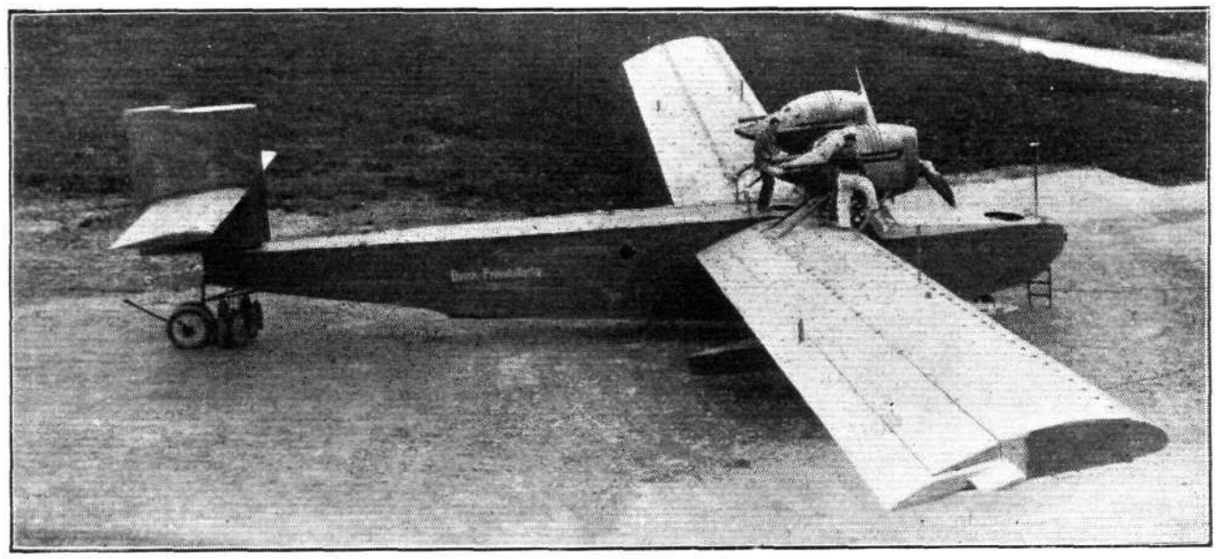
Dr. Rohrbach, who was greeted with hearty applause by a numerous audience, recounted briefly the advantages which all-metal construction had been found to possess as compared with wood construction. Among these were increased seaworthiness, less effect on the structure of sea-water, and a saving in structure weight of 15 to 20 per cent. If the question of absorption of water by wooden hulls was taken into consideration this saving was even greater. He asked to be forgiven if he devoted himself to the machines of which he had personal experience, and said that he knew very little about the machines designed and built by others.

For very large machines the lecturer thought the seaplane was the type most easily developed, questions of space for taking off and alighting being less serious than in the case of land aeroplanes. He showed a series of slides intended to demonstrate how the problem of increased structure weight with increase in size became much less serious if heavy wing loading was employed, using as a basis the transportation of a certain load over a given distance, at the same time indicating that the more heavily-loaded machine covering the distance in a shorter time made up for the larger amount of fuel consumed.

Dr. Rohrbach also outlined the reasons which had led him to adopt the monoplane type, and showed general arrangement drawings of a design for the biplane with which the comparison was made. This part of the lecture was somewhat unintelligible, the lecturer stating that the biplane structure would have given a saving in weight of approximately 300 kgs., but that its performance would have been inferior. Thus the ceiling for the biplane (estimated presumably) would have been 1,300 m., while that of the monoplane was 3,000 m.

The lecturer also stated that with heavy wing loading the loss in manœuvrability with size became less. Referring to the very large dihedral angle at which the wings of the Rohrbach monoplane were set, Dr. Rohrbach said that this had been found to result in making the machine quicker on the turns. A very minute change in dihedral had a very considerable effect on the rate of turning, and he thought the difference in the behaviour of machines of the same type might in some cases be due to some such small variation in dihedral. He had found out that an increase in dihedral of one-fifth degree was sufficient to counteract a very large increase in the moment of inertia of the machine.

Concerning the construction of the Rohrbach monoplane (photographs and a description of which were published in FLIGHT of July 17, 1924), the lecturer had very little to say, but a series of lantern slides were shown, which illustrated some of the constructional features. One slide which caused much merriment was a view of the Rohrbach with both its Rolls-Royce engines stopped, but rigged up with two small lugsails and proceeding on its way undismayed. It should, the lecturer thought, be quite possible for a large seaplane forced down by total engine failure to rig up a couple of sails and so to work slowly towards some point where there was more likelihood of being picked up. He referred to the use of a drogue, which kept the nose of the machine head to the seas, but thought sails gave some advantage in that they enabled the machine to be taken along a course not necessarily down wind. In other words, they left the crew a certain choice of direction.



THE ROHRBACH RO. II ALL-METAL FLYING BOAT: Two Rolls-Royce "Eagle" Engines. The men standing on the wings give a good idea of the size of the machine.

A most interesting film was then shown, illustrating the method adopted for transporting the Rohrbach over the ground on two large-diameter Duralumin wheels attached in the place normally occupied by the side-floats. Then came a section illustrating "business with engine," as Little Tich would say, and an examination of the wing structure by opening the hinged leading and trailing edge flaps. What particularly impressed the audience was the fact that, judging from the film, the most popular tool in use by the mechanics who looked after the machine was a hammer. Finally the machine was shown taxying, turning right and left in the most amazing manner by the use of a water rudder, and in full flight, the latter picture being taken from another aeroplane.

The Discussion

Mr. W. O. Manning said he would like to ask the lecturer his reasons for adopting the rectangular plan form of wing, as it was fairly generally admitted that the tapered wing was slightly better, affording a certain saving in structure weight, and being better able to withstand torsional stresses. He also wished to know what Dr. Rohrbach's experience had been with Duralumin, particularly as regards the effect on it of sea-water, and whether any trouble had been experienced with corrosion. With regard to the Rohrbach monoplane flying boat, he pointed out that it would appear that there might be a danger of the machine being blown over when moored in a tide running against the wind, thus

turning the machine side on to the wind and allowing the latter to get under the windward wing, owing to the very large dihedral.

Mr. J. D. North said it was not that he doubted the accuracy of Dr. Rohrbach's statements, but simply that, not having seen an advance proof of the paper, he had not been able to follow step by step the logical conclusions and deductions of the lecturer. He thought the comparisons between biplane and monoplane, and the result at which the lecturer had arrived as regards the relative efficiency of the two types, required qualification. He would like to know in what way the increase in wing loading was brought about, whether by altering the span or by reducing the size in some other respect. If the span was altered, then changes in the induced drag might be expected.

Flight-Lieut. Lucking said he thought the lecturer had not made out as good a case as he might have done for the all-metal seaplane. For instance, he related a case in which a large flying boat weighing some 18,000 lbs. when completed, gathered weight to the extent of 600 lbs. or so, a weight that could not be accounted for by the amount of bilge water, and which must therefore be ascribed to water soakage. The amount was a large proportion of the total weight, and if the all-metal flying boat avoided such soakage it was, he thought, one of the strongest arguments in favour of its adoption. With regard to the heavily loaded machine he said it might be expected that considerable difficulty would be experienced in taking off, unless the power-loading was very low. He would like to know whether the lecturer had found any trouble in getting the machine off.

Col. Cave-Brown-Cave desired to know if the side-float arrangement adopted by Dr. Rohrbach gave good riding in a seaway. He also expressed some astonishment at the fact that, as far as had been possible to judge from the lantern slides, the hull was flat-bottomed. He would like Dr. Rohrbach to give the reasons which had caused him to adopt this hull form, assuming that this *was* the shape of the hull.

Dr. Rohrbach in replying to the questions raised, said he agreed with Mr. Manning that the tapered wing was more economical in weight than the wing of rectangular plan form and without taper. It was, however, a question of expense. The tapered wing cost much more to build, at any rate so long as only small quantities were produced. If a type came to be produced in large quantities the tapering wing would, he thought, be adopted. On the question of corrosion, he had found that if care was taken to have the rivets made of the same alloy as that used in the sheet no trouble arose, while all seams and joints where two pieces of metal met should be electrically insulated from each other by some form of protective painting. As regards torsional strength of a wing, as a result of two years' experience, during which experiments had been made with portions of wings sand loaded and tested to destruction, it was now possible, by observing the direction and form of the fractures, to calculate the torsional strength and to strengthen the wing in the right place, lightening it in others, and thus provide the necessary strength without additional weight.

In reply to Mr. North, the lecturer stated that the increase in wing loading was arrived at by a geometrical reduction in the size of the more heavily loaded machine. The two types were not of equal span, the one being of 20 m. span and the other of 29 m. span. The aspect ratio and other proportions remained unaltered.

As regards the difficulty of getting off with a heavily loaded machine, this was, Dr. Rohrbach stated, mainly a matter of designing the planing bottom of the hull so as to be in sympathy with the higher wing loading. On the question of danger of the machine getting blown over by a lateral wind, the experiments were still being continued, but so far there had been no reason to fear that there would be any trouble on that score. The machine had been moored out in a high sea, and yet when tilted laterally to the extent of the dihedral angle (6 degrees) so that the one wing became horizontal, the wing tip had not touched even the crest of waves 4 ft. high.

Col. Ogilvie expressed his agreement with the lecturer in the opinion that the question of the large machine could best be solved by adopting heavy wing loading. A very hearty vote of thanks was then passed, and an interesting evening came to a close.

COMMERCIAL AIRSHIP DESIGN*

IT is useless to expect airship-owning firms to start running regular lines till they are convinced that the aeronautical engineers can provide them with airships that will attract passengers.

Airships will not attract passengers till they are safe, and till the fares can be low enough to bring them within the means of the average individual. Our commercial airship must fulfil the following requirements :—

(1) It must be structurally strong.
(2) It must be safe against fire.
(3) It must be very controllable in any weather.
(4) It must be cheap to run.

Experience with earlier airships of the R 33 type and others has shown that ample strength can be obtained when half the total displacement is devoted to the hull and engines. The new commercial Zeppelin, Z.R. 3, has this proportion. With increase in size it is possible to allot a smaller proportionate weight to the hull and engines while keeping the same strength.

As to the type of airship—whether rigid or semi-rigid—for commercial purposes, it is too early to form a definite opinion. My personal preference lies with the semi-rigid, anyhow for the smaller sizes. The new Parseval type, for instance, consists of a keel the whole length of the ship supported by gas-bags, as in the Zeppelin type, but divided longitudinally as well as transversely. They are under steel nets, and over all goes an outer cover, leaving a six-inch space between it and the gas-bags all round, which is very suitable for filling with inert gas. The upkeep of such an airship should be simple and cheap, and the whole of the metal-work under compressive loads is easily kept under supervision, which is not the case in the rigid type. The advantages and disadvantages of the two types are so nicely balanced, that till a ship of each type, of similar size, and employed on the same service, has been tested over a long period, it will not be possible to reach a decision, but it may be accepted that both types are perfectly capable of running an airship service quite efficiently.

Safety against fire.

The first and most pressing need is the abolition of petrol. There are always petrol fumes hanging about in large airships, and in hot climates the evaporation is serious. The most direct and simple way, of course, is to fit engines of the heavy-oil Beardmore type. A second way is to use hydrogen drawn from the gas-bags in conjunction with a heavy fuel in the ordinary engine, and the third way is to gasify crude oil, by a new process shortly to be introduced to the public by an inventor, a well-known petroleum expert.

Before considering the merits of these three systems, we have to consider another point—namely, the protection of the hydrogen against fire by putting a layer of inert gas round it. Various methods have been suggested from time to time, such as double-walled gas-bags containing nitrogen or ammonia gas. Here we met the difficulty that when the airship rises the protective gas will expand and blow off into the atmosphere, and there is no means of replacing it. It has been proposed to insert ballonnets into each gas-bag, into which the inert gas would flow as it expanded, but in that case it would push out hydrogen and make the ship heavy. The double-walled gas-bags are also of undue weight. By far the simplest and most efficient means appears to be to utilise the exhaust gases for protective purposes. There is an ample and constant supply of these which have only to be cleaned and cooled below boiling point, so as not to hurt the fabric, and then turned into the ring space between the gas-bag and outer cover. The ordinary doped outer cover should be quite gas-tight enough to contain it. We need only deal with a portion of the exhaust gas, such as can be dealt with by the weight of apparatus we can afford to carry, and a large part of the cooling is done in the ring space. First we can use the gas for cooking, as at present, and then for warming the living spaces. If it requires further cooling it can be passed between metal plates let in flush with the side in the slip stream of the propeller and finally expanded into the ring space.

Here, being heavier than air it will accumulate at the bottom, and the air will be forced out through lightly-loaded valves into the trunks for leading away hydrogen gas when valved, being taken down to the bottom of the trunk below the hydrogen gas valve by a duct. When all the air is forced

* Abstract of Paper read by Commander F. L. M. Boothby, C.B.E., before the Institution of Aeronautical Engineers, at the Engineers' Club, Coventry Street, W., on October 17.

out, exhaust gas will follow by the same route and fill the trunks, finally escaping into the atmosphere. This is all plain sailing so long as the airship is climbing or flying horizontally; if she dives at more than about 50 ft. per min. the whole supply of exhaust gas could not make up for the shrinkage, and it is necessary to admit air to the top of the airship again, either through automatic valves or by pumping it in from the slip-stream of the propellers in the usual way. It is argued by some that it is unnecessary to supply this gas protection, as a Zeppelin has already been struck by lightning in flight without harm, and the metal framework or net gives sufficient protection. That may be so but it does not provide for the case of spontaneous combustion from oily waste left in the ring space, or from the accidental firing of a Verey light into the gas-bags, etc., which the layer of exhaust gas has been proved capable of doing. It only fails where a stream of incendiary bullets is concentrated on one spot from a machine gun, when hydrogen may be carried by the hose effect into the open air and ignited there; but one does not expect to meet with a machine gun firing incendiary bullets at close range in a commercial ship. In any case I feel convinced of the importance of supplying inert gas to the exhaust trunks of the airship. Steps are now taken to see that an explosive mixture of hydrogen and air does not remain in the trunks, by scouring them with air, but as soon as a hydrogen gas valve is opened an explosive mixture *must* be formed. The hydrogen passing out into the atmosphere is a good conductor of electricity, and if any atmospheric discharge does travel down it, it is better that it should find a mixture of hydrogen and exhaust gas at the bottom than a mixture of hydrogen and air. Nothing would happen in the first case; the second would involve a violent explosion in the trunk—which may account for the loss of the Dixmude. Having in mind the desirability of using the exhaust gas for protective purposes, let us glance further at the types of heavy fuel engines available.

While the use of the Beardmore type engine removes our petrol trouble, it does not provide the greatest possible econony in running. In an airship, for every ton of liquid fuel consumed 33,000 cubic ft. of hydrogen have to be got rid of to keep the airship in trim. This hydrogen is a valuable fuel. In 1 lb. of hydrogen (which is about 190 cubic ft.) there are approximately 62,000 British thermal units compared to some 19,000 in 1 lb. of petrol. Previously it was necessary to blow this hydrogen into the atmosphere, and waste it, in order to keep the ship in trim. The Eastern Asiatic Oil Company and Mr. Ricardo carried the tests on with kerosene, getting the consumption down to 0·35 lb. per b.h.p. hour. Since then, by a slight modification in the original process, an engine has been run on gas oil. Using these heavy oils the engines will doubtless require frequent cleaning, but if they will run for 50 hours non-stop it is sufficient for our purpose. The engines should be specially designed for rapid dismantling. The War-time "Maybach" was very good in this respect, it being possible to lift the cylinders in flight and have the engine running again within four hours, and this can doubtless be repeated. Under this system, using gas oil, we require 350 lbs. of liqnid fuel, costing £1, and 5,000 cubic ft. of hydrogen, costing £1 5*s*., total £2 5*s*., per 1,000 h.p. per hour. Compare this with the cost of running on petrol alone, when the fuel for 1,000 h.p. hour would cost £5 17*s*., plus 7,000 cubic ft. of gas wasted, costing £1 15*s*., total £7 12*s*.

A new process of using crude oil commercially has recently been introduced. This oil only costs 3½*d*. per gal., as compared to 5*d*. for gas oil and 10*d*. for kerosine. I am not at liberty to describe the process as the inventor has not yet published his system. A plant using this process is working in London, so it has reached the practical stage. Suffice to say that crude oil is put into a generator which weighs about 50 lbs. for an engine requiring 60 gals. of fuel an hour. The crude oil is converted into gas, which is cooled and cleaned. If used in the ordinary engine without a supercharger, 78 per cent. of the maximum h.p. is obtainable. The consumption is about 0·6 lb. per h.p. hour. Using hydrogen in conjunction with this gas, full power can be obtained from the engine, and the consumption drops to about 0·45 lb. per h.p. hour, so that for our 1,000 h.p. unit we should require 450 lbs. of liquid fuel, costing 14*s*. 7*d*., and 6,400 cubic ft. of hydrogen, £1 12*s*., total £2 6*s*. 7*d*. per 1,000 h.p. hour. Thus this process is not quite so economical as the last as regards cost, whilst the extra weight of liquid fuel required, which amounts to about a ton per 1,000 h.p. unit per 24 hrs., reduces the amount of paying load which can be carried.

There are other possibilities of this process, however. It is customary for airships to carry about 10-15 per cent. of their total lift in the form of water ballast. Suppose we substitute crude oil. When it is required to use it as ballast, instead of throwing it overboard, we can make it into gas, which can be stored till required for use in the engines, and this gas is slightly lighter than air. We have thus got rid of our deadweight and yet have the fuel. The extra weight involved in this system is the generator, and diaphragms in two or three gas-bags to allow of the crude oil gas being stored there, replacing the hydrogen as used in the engines. A ton should cover the total extra weight involved in a ship like the Z.R.3, a sacrifice well worth making in view of the increased radius of action obtainable. Of course, this process of discharging ballast is slow, perhaps half a ton an hour could be reached, but in a sudden emergency the whole supply of crude oil could be discharged overboard, just like water ballast. Sudden emergencies should generally be dealt with by the use of swivelling propellers, which in my view should be fitted in all commercial ships.

It is sometimes pointed out that as airships increase in size, the smaller proportionate horse-power is required to drive them at a given speed, and consequently the effect of swivelling propellers decreases as size increases, which is true. Nevertheless I think that they are always worth fitting for navigational and economic reasons. I believe we can meet with disturbed air, when rudders and elevators are little use, and if caught in down draught the ability to be able to apply the equivalent of 5 tons of ballast by means of your engines in a ship of the Z.R.3 type is most useful. The same effect could be got by dropping water ballast, but this can only be done a limited number of times, while swivelling propellers can be applied as often as necessary. They are also available for ascent in a violent up-draught, when a ship might be carried up and lose a lot of irreplaceable gas. They are also useful for working down through low clouds when it might be dangerous to dive a long ship through them. On the economic side we can imagine a ship without swivelling propellers, lying at her mooring mast with a full load and full of gas. Starting with a small initial lift she will put her helm up and force herself up to her safe flying height (which may be taken at three times the ship's length) by means of her engines and elevators. If we take this to be 2,000 ft., the ship will blow off 6 per cent. of her gas in so doing, which is entirely wasted. In an 80-ton ship this would amount to 158,000 cub. ft., cost £39 10*s*. With swivelling propellers this gas need not have been taken on board, as no initial lift is necessary for leaving the mooring mast.

In considering the design of commercial airships due weight must be given to the important question of working them with the smallest number of men, as this is of even greater importance in the air than it is on the sea. Thus in British and German naval airships two men were allowed for each engine besides an engineer officer, and nine other officers and men.

By simplification of design it should be possible to reduce this to one man per engine and an engineer officer; one man looking after two engines in normal flight. Again, in the control car was a helmsman, a man for the elevator controls, and an officer for navigating, etc. In small airships one man could, and frequently did, perform all these duties for long periods. There is no reason why he should not do so in large ships if suitable relay gear is used for operating controls.

Also we might follow the practice of some merchant ships and put our control position aft. In the streamline fins fitted in recent practice, ample room can be provided for rudder and elevator controls, so avoiding the long leads of wire and the necessary arrangements for taking up the slack.

What is now wanted is some process of manufacturing hydrogen with the airship's own resources. Sitting on the sea there is plenty of hydrogen in the water around, if some reasonably light electrolytic process can be found. Perhaps some system of cracking oil may meet our requirements, but it is a point that requires the earnest consideration of every aeronautical engineer who wishes to see the empire linked up by real commercial aircraft at the earliest possible date.

◈ ◈

R.A.F. Airman Rewarded

ACTING FLIGHT-SERGT. J. S. BRETT, R.A.F., of Bircham Newton Aerodrome, Norfolk, was among several recipients of awards for bravery in saving life made on October 17 by the Society for the Protection of Life from Fire. Brett was presented with the bronze medal of the Society for his courageous action on July 2 last whilst carrying out flying practice with anti-aircraft batteries. One engine of the machine caught fire and continued to burn. Brett climbed out on the wing with a hand extinguisher and sprayed the engine, keeping the flames under while the pilot dived and brought the machine to land.

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

THE ROYAL AIR FORCE

London Gazette, October 14, 1924

General Duties Branch

The following Pilot Officers are promoted to the rank of Flying Officers :—H. C. Evans (June 20) ; C. W. A. Byrne (August 13) ; D. S. Brookes, W. D. Baxter, J. E. Doran-Webb (October 15). Air Marshal Sir J. M. Salmond, K.C.B., C.M.G., C.V.O., D.S.O., is placed on half-pay, scale A (October 9).

Stores Branch

Flying Officer W. T. Lewis is granted a permanent commission in the rank stated (October 15). The following Flying Officers are granted permanent commissions for accountant duties in the rank stated (October 15) :—J. J. Caiger, W. E. Ennis, A. W. Gray, C. G. Prior.

Medical Branch

The following are granted permanent commissions in ranks stated (October 15) :—Flight Lt. T. McClurkin, M.B., D.P.H. ; Flying Officer C. V. D. Rose. Flying Officer (hon. Flight Lt.) G. R. Hall, M.D., is promoted to the rank of Flight Lt. (October 8).

Chaplains' Branch

The Rev. J. Black, O.B.E.,M.A., is granted an hon. commission as a Chaplain without pay and allowances with the relative rank of Squadron Leader (September 20).

Reserve of Air Force Officers

The following are confirmed in rank :—Flying Officers.—G. H. Welsh, D.F.C. (September 16) ; H. G. Brackley, D.S.O., D.S.C. (October 8). Pilot Officers.—W. Dougall (September 20) ; C. H. L. Needham (September 25) ; V. Vickers (September 28). Flying Officer J. E. A. Hoare is transferred from Class A to Class C (October 14). The commission of Pilot Officer on probation J. M. Clarke is terminated on cessation of duty (July 25). The commission, of Flying Officer on probation, A. S. Poynton, is terminated (October 14).

Z.R.3's FLIGHT TO AMERICA

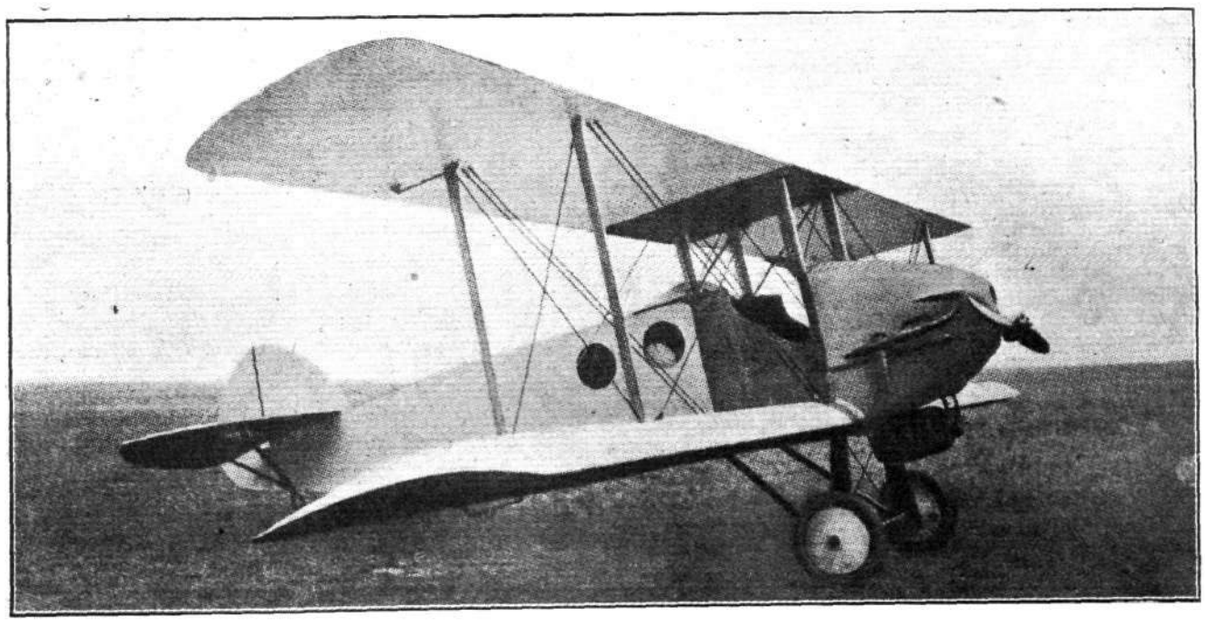
FURTHER to our report in last week's FLIGHT of the Z.R.3's journey across the Atlantic from Friedrichshafen to Lakehurst, New Jersey, the following notes may be of interest. The Z.R.3 landed at Lakehurst at 9.55 a.m. (3 p.m. G.M.T.) on Wednesday, October 15, having taken 80 hrs. 45 mins. to cover 5,006 miles. The American coast was first sighted out of the mist off the southern portion of Nova Scotia just before midnight, October 14. The airship then followed the coast to Cape Cod, turning over the Truro lighthouse towards Boston, where a welcome of cheers and whistles was received in spite of the early hour—4 a.m. After leaving Boston the Z.R.3 reduced speed in order to arrive over New York in broad daylight, and on reaching Mitchell Field, Long Island, she was met by an escort of seven aeroplanes. By 7.45 a.m. she passed over the Statue of Liberty, flying at an altitude of about 500 ft. For nearly an hour the airship cruised over New York, giving the inhabitants a splendid view of herself.

When the Z.R.3 eventually arrived at Lakehurst some time was spent inspecting the " lie of the land " before the descent was actually made. This, however, was successfully accomplished at 9.55 a.m., and, with the help of 300 sailors and marines, the airship was safely housed in the shed.

Commander J. H. Klein, of the Lakehurst station, was the first to leave the airship, and he was followed, when the latter was safely housed, by the German navigators, headed by Capt. Eckner. On landing, Capt. Eckner stated that they had put up a new world's record for continuous flight—5,006. They had changed the course, he said, from the direct line from the Azores because they found themselves heading into a south-west wind of increasing strength. The first part of the voyage was fine, but the last part was full of heavy weather.

From about 5 a.m. on the Tuesday morning, October 14, they battled all day against heavy weather, the wind blowing 55-60 m.p.h. Favourable winds, however, said Capt. Eckner, pushed them past Boston at the rate of 90 m.p.h.

President Coolidge, on being informed of the safe arrival of the Z.R.3 at Lakehurst, immediately despatched a message to Captain Eckner congratulating him on the Z.R.3's epoch-making achievement, saying : " It is a matter of great satisfaction to me and to the people of the United States that peaceful relations between Germany and America have been fully re-established, and that this great airship has inaugurated the first direct air flight between Germany and America.



THE NIEUPORT-DELAGE TYPE 38 BIPLANE : A Service Machine which can be used either as a school machine or for aerial photographic work, etc. By means of an interchangeable body, this machine can also be used for commercial work, carrying two passengers. It is fitted with a 190 h.p. Renault, or 180 h.p. Hispano-Suiza engine. The main characteristics are : Span, 11·1 m. (36 ft. 5 ins.) ; length, 8 m. (26 ft. 3 ins.) ; chord, 1·8 m. (6 ft. 0 in.) ; gap, 2 m. (6 ft. 6 ins.) ; wing area, 37·8 sq. m. (406·7 sq. ft.) ; weight empty, 850 kg. (1,874 lbs.) ; weight loaded 1,250 kg. (2,756 lbs.) ; weight per h.p., 6.25 kg. (13.8 lbs.) ; wing loading, 33·1 kg./m². (6·75 lbs./sq. ft.) ; speed, 175 km.p.h. (108·75 m.p.h.) ; climb, 1,000 m. (3,280 ft.) 8 mins. 35 secs., 3,000 m. (10,000 ft.), 36 mins. 45 secs. ; ceiling, 4,000 m. (13,120 ft.).

AIR POST STAMPS

By DOUGLAS B. ARMSTRONG

Mukden-Newchang Air Post

IN April and May of this year an experimental air post was instituted by the Chinese postal authorities between the important commercial centres of Mukden and Newchang in Manchuria, operating twice weekly. Air post letters were franked exclusively with the 15 cents Chinese air post stamp of 1921 and bore the ordinary dated postmarks of the terminal towns.

More Swiss "Etiquettes"

ONE of the latest Swiss semi-official air post *etiquettes* made its début at La Caquerelle (Rangiers) on August 31, 1924, when an air post to Lausanne was organised in connection with the unveiling of a national memorial to the mobilisation of the Swiss Army during the Great War. A temporary post office was established on the fête ground, where letters and postcards franked with a souvenir stamp were accepted for transmission to Lausanne by official air post. The adhesive stamp of the face value 40 centimes shows a reproduction of the monument of a Swiss soldier guarding the Alpine passes, printed in blue, grey and brown. The face value of the postcard is 20 centimes.

Semi-official stamps and cards were also provided on the occasion of a temporary air post from Solothurn to Grenchen on September 1, 1924, printed in blue, yellow and black, and of the denomination 30 centimes.

This latter experiment appears to have been entirely unauthorised, the postal authorities having refused to grant the necessary facilities. The octagonal obliterations applied in red or violet and inscribed "Flugplatz 31. Aug. 24 Grenchen" and "Flugplatz 31. Aug. 24 Solothurn," were likewise of a purely private nature, the letters and postcards to the number of about 10,000 being forwarded to Zurich by *ordinary post*, and thence only by the Swiss Government air service to their destinations.

Canadian Air Mail Delivery

A CANADIAN journal makes mention of an issue of special "stamps" for aerial mail delivery having been introduced for an aeroplane post that has been in operation since May last from rail-head to the Rouya Goldfields in Northern Quebec. The company operating the service is authorised to charge a fee of 1*s.* in addition to ordinary postage for letters carried by air over its system.

The stamps are engraved with the name of the issuing concern, the Laurentide Air Service, Ltd., and printed in green, the face value being 25 cents and the inscription reading "Special Air Delivery."

On October 1, 1924, an official air post flight was made from Estevan (Saskatchewan) to Winnipeg (Manitoba), when a special cancellation was applied to correspondence thus forwarded.

Air Post Collectors Meet

THE Aero Philatelic Club opened its winter session at 89, Farringdon Street, E.C. 4, on September 26, when the important air post collection formed by Mr. T. A. Chaplin was displayed. Most of the principal rarities were included, and a specially notable feature of the collection was the artistic embellishment of the pages with appropriate and symbolical drawings illustrating the flights represented. The club meets monthly from September to May, and its membership is steadily growing.

Aerogrammes

THE latest series of Syrian air post stamps is overprinted in both French and Arabic. The same applies to the separate issue for the state of Lebanon, whereon the name appears, however, in abbreviated form thus: "Gd. Liban."

A large number of souvenir postcards received by the Norwegian post office for transmission by the abandoned North Polar Air Expedition is being held at the G.P.O., Christiania, in anticipation that Amundsen will be able to make the attempt next year.

America has introduced an effective advertising postmark with the device of an aeroplane, lettered "AIR MAIL SAVES TIME."

An issue of air post stamps is foreshadowed in connection with the projected air post line from Lisbon to Madrid, which is to be inaugurated early in the new year.

A single sheet of the 5 centimos Spanish air post stamp has been discovered with the overprint "Correo Aereo" *inverted*. It belongs to one of the first printings, and was sold over the post office counter at Madrid in the ordinary course during the early days of 1921.

IMPORTS AND EXPORTS, 1923-1924.

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; for 1921, see "FLIGHT" for January 19, 1922; for 1922 see "FLIGHT" for January 18, 1923; and for 1923, see "FLIGHT" for January 17, 1924.

	Imports.		Exports.		Re-Exports.	
	1923.	1924.	1923.	1924.	1923.	1924.
	£	£	£	£	£	£
Jan. ..	466	2,213	60,079	52,239	280	2,219
Feb. ..	641	920	120,236	26,349	3,040	335
Mar. ..	589	11,381	71,945	34,113	689	509
Apr. ..	8,508	373	167,757	56,998	462	6,014
May ..	845	3,426	55,427	125,138	728	4,162
June	1,433	1,219	141,381	87,629	1,410	2,115
July ..	192	1,510	62,025	179,292	1,334	2,708
Aug.	2,054	687	57,704	247,982	344	950
Sept.	578	4,383	39,069	67,749	106	641
	15,306	26,112	775,623	877,489	8,393	19,653

PUBLICATIONS RECEIVED

Aeronautical Research Committee, Reports and Memoranda: No. 902 (*E.* 10).—Air-Hydrogen Explosions in Closed Vessels. By R. W. Fenning. April, 1924. Price 2*s.* net. *No.* 913. (*Ae.* 139).—The Distortion of a Stiff Jointed Plane Polygonal Frame under Loads Applied in Its Plane. By Prof. A. J. Sutton Pippard and P. Field Foster. July, 1924. Price 1*s.* 3*d.* net. *No.* 914 (*Ae.* 140).—Note on the Application of the Vortex Theory of Aerofoils to the Prediction of Downwash. By L. F. G. Simmons and E. Ower. April, 1924. Price 6*d.* net. London: H.M. Stationery Office, Kingsway, W.C.2.

The Motor Manual. 25th Edition. London: Temple Press, Ltd., 7-15, Rosebery Avenue, E.C. Price 2*s.* 6*d.* net.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1923

Published October 23, 1924

14,044. D. J. MOONEY. Metal framework of aircraft. (222,172.)
23,804. P. UHLENDAHL. Landing and housing arrangements for airships. (222,310.)
27,239. V. N. LOGAN. Windmills combined with aircraft, etc., for propelling same. (222,337.)

APPLIED FOR IN 1924

Published October 23, 1924

11,048. P. N. C. JAMES. Double control of combined type car for aeroplanes. (215,748.)

FLIGHT

The Aircraft Engineer and Airships

36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.
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Telephone: Gerrard 1828.

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